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(56) Documents cited  
GB 2178965 A GB 2169265 A GB 2142246 A  
GB 2129691 A GB 1387954 A

(58) Field of search  
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INT CL B65D

(54) Medicament-containing article and device therefor

(57) A medicament-containing article (1) is provided which comprises a base member (2) having a plurality of apertures extending therethrough from one face of the base member to an opposite face of the base member, and a pair of lids (3,4) each positioned over a respective one of the faces of the base member. Each lid has a raised portion (6, 7) where it covers each aperture so that a respective compartment is defined by each aperture and the adjacent raised portions of the lids, the raised portions being at least partly severable from the remainder of the lids. A quantity of medicament is contained within each compartment. A dispensing device (10) is provided which is adapted to receive an article. The device comprises means (24, 28, 30) for severing the raised lid portions at opposite ends of a given aperture, and ducts (44, 50) defining an air-flow path through that aperture to enable medicament to be inhaled therefrom.

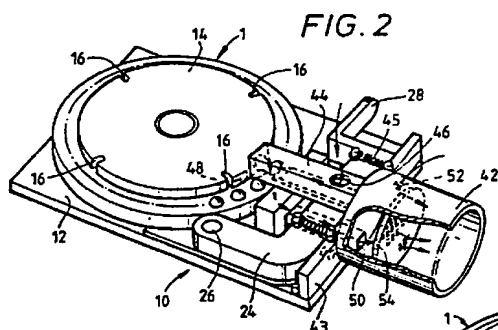


FIG. 2

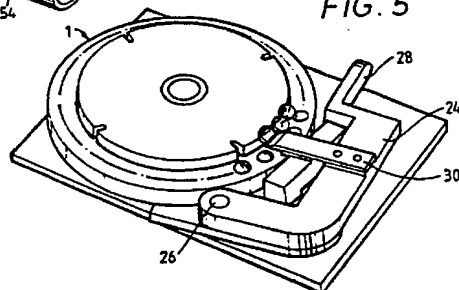


FIG. 5

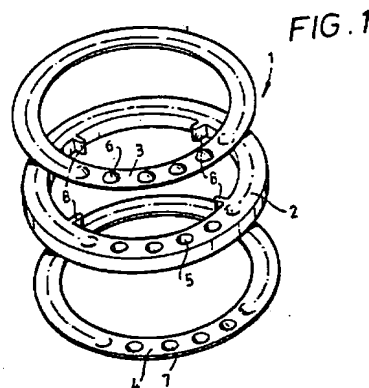


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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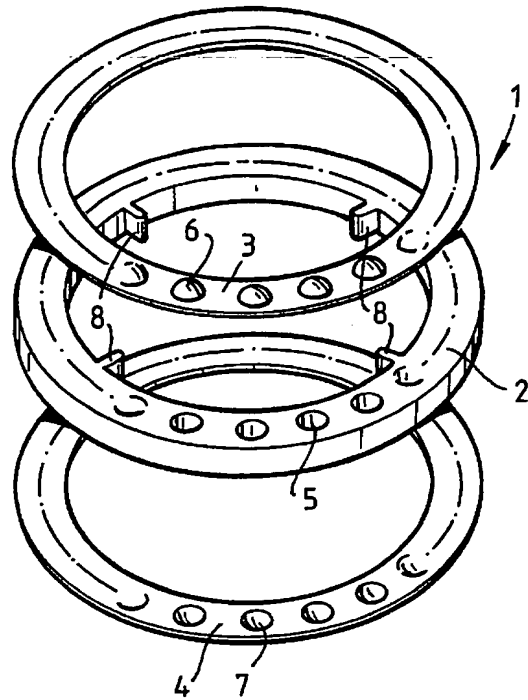


FIG. 1

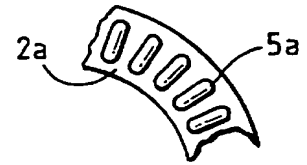


FIG. 1a

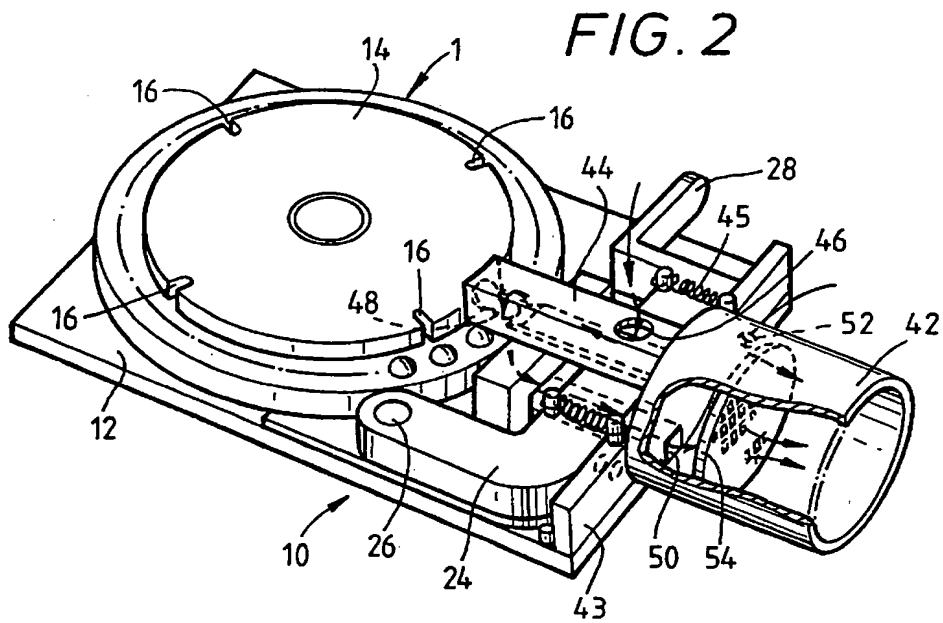


FIG. 2

FIG. 3

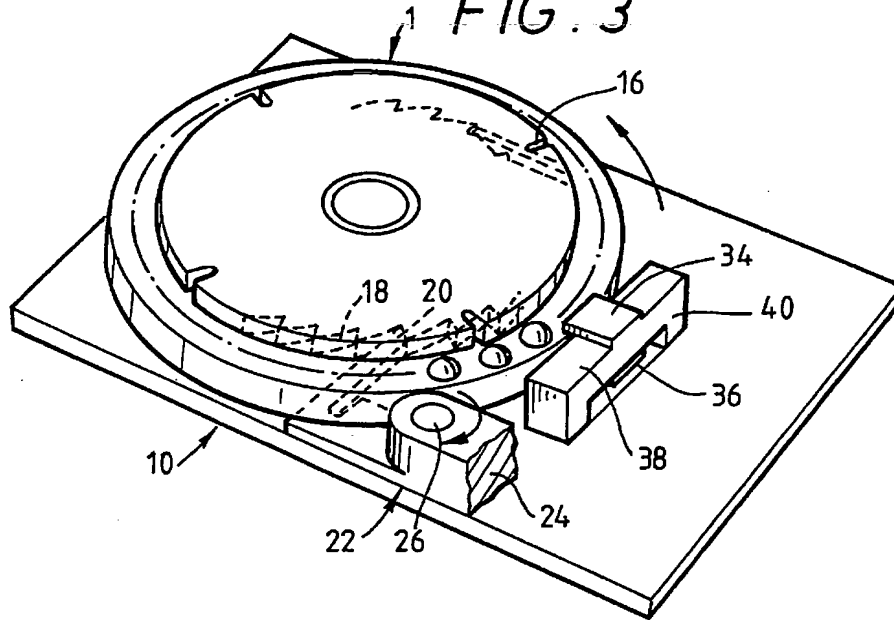
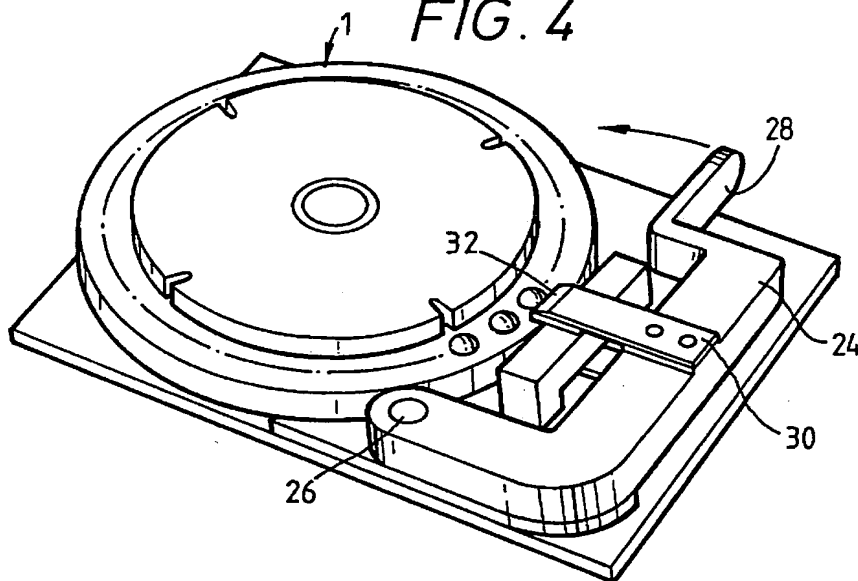
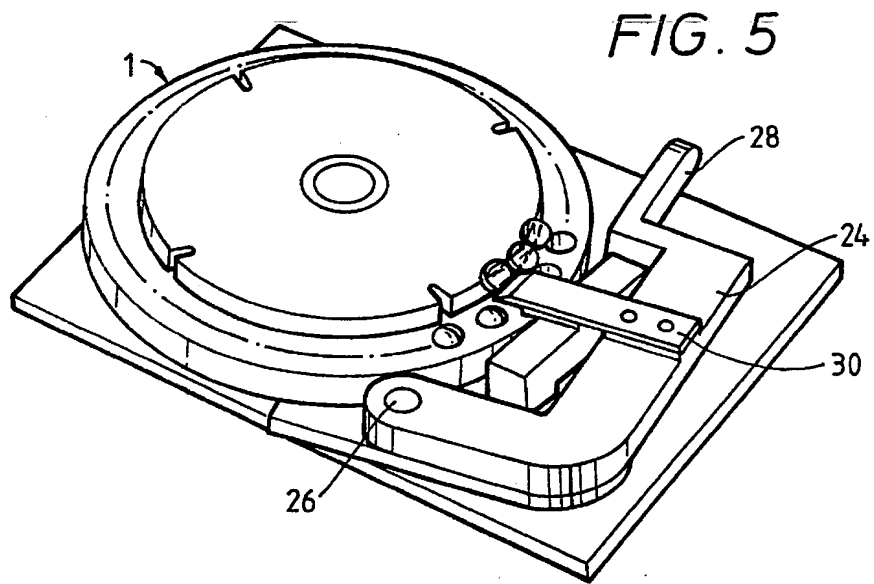


FIG. 4





**FIG. 7**

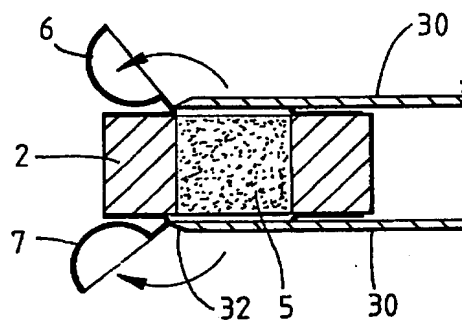


FIG. 6a

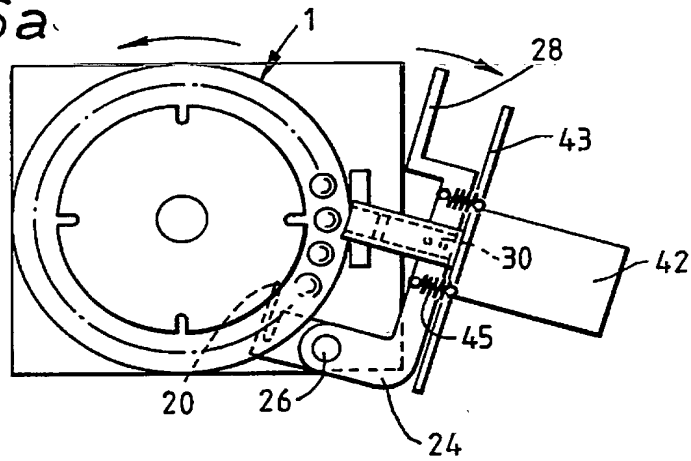


FIG. 6b

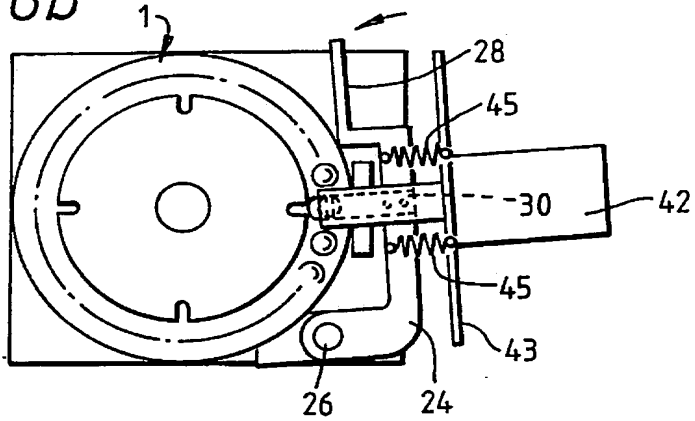
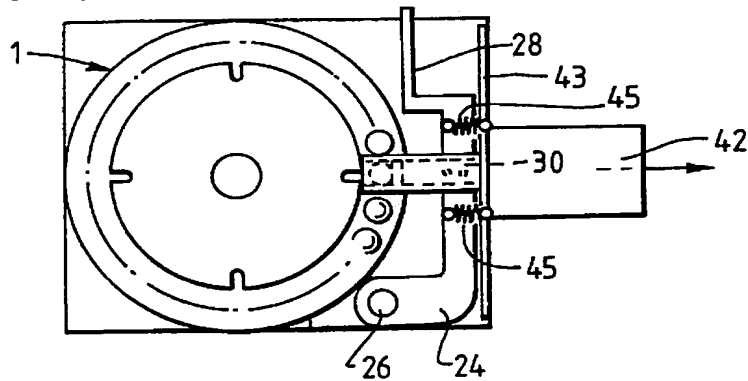


FIG. 6c



MEDICAMENT-CONTAINING ARTICLE AND DEVICE THEREFOR

This invention relates to a device by which a medicament in solid finely divided form can be administered to or by a patient inhaling through the device. The invention further relates to a medicament  
5 container for use therein.

It is well known for medicament in powder or other finely divided form to be supplied in capsules which are loaded by a patient into a dispensing device. The  
10 medicament is then released from the capsule and inhaled by the patient, usually through the mouth, but sometimes through the nose.

However, the use of capsules has various disadvantages, and GB-A-2129691, GB-A-2142246 and GB-A-  
15 2178965 describe the use of blister packs to hold the medicament, together with devices for dispensing the medicament from those blister packs. The present invention provides an alternative and convenient form of pack, and a dispensing device using such a pack.  
20 In particular, it provides a pack which can contain a larger number of doses for a given size of pack, with a consequent reduction in the size of dispensing device required to handle a pack having a given number of

doses.

According to the present invention there is provided a medicament-containing article which comprises means defining at least one compartment, the compartment being closed by at least one lid having a raised portion where it covers the compartment, the raised portion being at least partly severable from the remainder of the lid; and a quantity of medicament contained within the compartment.

According to the present invention there is further provided a medicament-containing article which comprises a base member having a plurality of apertures extending therethrough from one face of the base member to an opposite face of the base member; a pair of lids each positioned over a respective one of the said faces, each lid having a raised portion where it covers each aperture so that a respective compartment is defined by each aperture and the adjacent raised portions of the lids, the raised portions being at least partly severable from the remainder of the lids; and a quantity of medicament contained within each compartment.

Preferably the base member is annular in shape, with the apertures forming a circular array. The medicament preferably comprises an active ingredient together with a carrier therefor.

The present invention further provides dispensing

devices adapted to receive medicament-containing articles of the type defined above. The devices comprise means for severing the raised lid portion or portions, and path means adapted to define an air-flow path through the compartment to enable medicament to be inhaled therefrom.

The invention is further illustrated in the accompanying drawings in which:

Figure 1 is an exploded perspective view showing the article of the present invention;

Figure 1a is a scrap view showing part of a modified form thereof;

Figure 2 is a perspective view of a dispensing device according to the invention, with a medicament-containing article mounted thereof;

Figure 3 is a view similar to Figure 2 but with part of the dispensing device broken away to enable other components to be seen;

Figure 4 is a view similar to Figures 2 and 3, but with fewer of the dispensing device components omitted than in Figure 3;

Figure 5 is a view similar to Figure 4 but showing the device in a different position;

Figures 6a, 6b and 6c show the dispensing device in three successive stages of operation; and

Figure 7 is a vertical section, on an enlarged scale, showing the raised lid portions being severed.



The drawings show a medicament-containing article having a plurality of compartments each closed by a pair of lids having raised lid portions. Alternatively, however, there might be only a single compartment, and the compartment or compartments might have only a single lid with raised lid portion or portions.

Figure 1 shows a medicament-containing article 1, hereinafter referred to simply as a container, which comprises a base member 2, a lid 3 sealed to one face of the base member 2 and a lid 4 sealed to the opposite face. The member 2 and the lids 3 and 4 are annular in shape. The member 2 is preferably formed of an injection-moulded plastics material, and the lids 3 and 4 are preferably formed of cold-formed aluminium foil laminate, heat sealed to the member 2.

The member 2 has a plurality of apertures 5 of circular cross-section which extend therethrough from one face to the other. The apertures 5 form a circular array around the member 2. Each of the lids has a plurality of raised portions 6 and 7 respectively which are aligned with the apertures 5, so that each aperture has a raised lid portion immediately above it and a raised lid portion immediately below it. It is to be understood that in the present context the use of the word "raised" does not denote a particular direction in space, but rather denotes that each

portion extends away from the base member 2. Thus, in the orientation shown in Figure 1, the raised portions of the lid 3 will extend upwardly, and the raised portions of the lid 4 will extend downwardly.

5 Each aperture 5, together with its adjacent lid portions 6 and 7, defines a compartment within which is a quantity of medicament. This preferably comprises at least one active ingredient together with a carrier. The quantity of medicament within each compartment is  
10 preferably chosen so as to be that required for a single dose.

As can be seen in Figure 1, the base member 2 is provided with four inwardly directed locating lugs 8, which serve to orientate the container in the  
15 dispensing device described below.

In Figure 1 the apertures 5 have been shown as being circular in cross-section, with the raised lid portions 6 and 7 being correspondingly circular. Figure 1a shows part of an alternative form of base  
20 member 2a which has apertures 5a which are elongated in the radial direction. This base member is used in conjunction with lids in which the raised lid portions are correspondingly elongated. The modification shown in Figure 1a has an advantage over what is shown in  
25 Figure 1, in that, for a given cross-sectional area of aperture, a larger number of apertures can be accommodated in a base member of given size.

Typically, thirty circular apertures can be accommodated in a base member whose outside diameter is 50mm, and fifty apertures of the same cross-sectional area can be accommodated in a base member of the same size if the apertures are elongated as in Figure 1a.

Turning now to Figures 2 to 5, the container shown in Figure 1 is received, in use, in a dispensing device 10. This comprises a fixed chassis 12 which is shown schematically as a rectangular block, though in practice a chassis would be used whose shape was more appropriate for handling by a patient. The container 1 is mounted on the chassis 12 for rotation with respect thereto by a ratchet wheel 14 which is snap-fitted (by means not shown) to the chassis and which is provided with four recesses 16 each of which engages a respective one of the locating lugs 8 on the container. Thus, rotation of the ratchet wheel 14 causes the container to rotate also.

The ratchet wheel 14 has ratchet teeth 18 extending completely around the periphery thereof, and some of these teeth are shown in Figure 3. A pawl 20 of a wheel-rotating mechanism 22 engages successively in each of the teeth 18. The rotating mechanism 22 comprises a cranked arm 24 which is pivoted to the chassis by a pivot 26 and which terminates in a lever 28 by means of which a user can pivot the rotating mechanism 22.

The cranked arm 24 carries, intermediate its ends, a pair of blades 30, for example of stainless steel, each having a cutting edge 32. The blades 30 pass slidably over the outer surfaces of respective guide plates 34 and 36 which extend from the upper and lower surfaces respectively of the cross member 38 of a bridge 40 secured to the chassis.

The device is provided with a mouthpiece 42 which is secured to the arm 24 via a bar 43 and a pair of tension springs 45. An air inlet duct 44 is provided which has an air inlet aperture 46 and a further aperture 48 which is positioned immediately above a location where a medicament-containing compartment is aligned with the blades 30, referred to below as the operating station. The duct 44 is closed at its ends, and does not communicate directly with the mouthpiece 42.

A second duct 50 is provided which has an opening (not shown) directly below the compartment which is at the operating station. The duct 50 communicates with the mouthpiece 42.

In order to reduce the resistance to inhalation, the mouthpiece 42 is provided with at least one auxiliary air inlet aperture 52. The mouthpiece is further provided with a grid 54 which acts as a coarse filter and serves to prevent unwanted material being inhaled, whilst permitting air and the entrained

powdered medicament to pass therethrough.

The operation of the device can most conveniently be understood by consideration of Figures 6a to 6c.

In the position shown in Figure 6a the lever 24 is  
5 rotated in the direction shown by the right hand arrow, using the lever 28, thereby causing the pawl 20 to turn the ratchet wheel 14 by an amount equal to the annular distance between adjacent ratchet teeth 18. The amount of this rotation is equal to the annular distance  
10 between adjacent compartments in the container, and serves to bring a fresh compartment to the operating station.

The lever 24 is then pivoted in the opposite direction as shown in Figure 6b. This causes the  
15 cutting edges 32 of the blades 30 to engage respective ones of the raised lid portions of the container which is at the operating station. The springs 45 are extended in tension, as a result of the resistance to movement of the blades 30 (and hence of the bar 43)  
20 which is exerted by the lid portions. The blades at least partly sever the lid portions from the remainder of the lid, as can be seen from the enlarged view shown in Figure 7. The use of the lever gives a mechanical advantage of approximately 2:1 as regards the force  
25 required to cause the blades to sever the lid portions. As can also be seen from Figure 7, there is a small gap between each blade and the respective face of the

container, the presence of which improves the cleanness of the cut.

The lever is then withdrawn to the position shown in Figure 6c. The user then places his mouth over the mouthpiece 42 and inhales. This causes air to flow in through the air inlet aperture 46, along the duct 44, out of the duct 44 through the aperture 48, through the compartment at the operating station (thereby entraining medicament from the compartment), into the duct 50 through the adjacent aperture (not shown), through the duct 50 and thence into and through the mouthpiece 42. In this way the user inhales air which has medicament entrained therein, and the auxiliary air flow entering the mouthpiece through the aperture 52 ensures that the resistance to inhalation is not too great. The contents of the compartment are substantially emptied by this act.

## CLAIMS:

1. A medicament-containing article which comprises means defining at least one compartment, the compartment being closed by at least one lid having a raised portion where it covers the compartment, the raised portion being at least partly severable from the remainder of the lid; and a quantity of medicament contained within the compartment.

2. A medicament-containing article which comprises a base member having a plurality of apertures extending therethrough from one face of the base member to an opposite face of the base member; a pair of lids each positioned over a respective one of the said faces, each lid having a raised portion where it covers each aperture so that a respective compartment is defined by each aperture and the adjacent raised portions of the lids, the raised portions being at least partly severable from the remainder of the lids; and a quantity of medicament contained within each compartment.

3. An article according to claim 2, wherein the base member is annular in shape, with the apertures

forming a circular array.

4. An article according to claim 3, wherein the lids are also annular in shape.

5. An article according to any one of claims 2 to 4, wherein each aperture is circular in cross section.

6. An article according to any one of claims 2 to 4, wherein each aperture is elongate in cross section.

10 7. An article according to any one of claims 2 to 6, wherein the base member is formed of a plastics material.

15 8. An article according to any one of claims 2 to 7, wherein the lids are formed of an aluminium laminate.

9. A dispensing device adapted to receive a medicament-containing article according to claim 1, the device comprising means for severing the raised lid portion, and path means adapted to define an air-flow path through the compartment to enable medicament to be inhaled therefrom.

20



10. A dispensing device adapted to receive a medicament-containing article according to any one of claims 2 to 8, the device comprising means for severing the raised lid portions at opposite ends of a given aperture, and path means adapted to define an air-flow path through that aperture to enable medicament to be inhaled therefrom.

11. A device according to claim 10, comprising a fixed chassis on which the said severing means is mounted to define an operating station, the chassis being adapted to receive the medicament-containing article for indexing movement with respect to the severing means to bring each compartment of the said article successively to the operating station.

12. A device according to claim 11, wherein the said article is rotatably mounted with respect to the severing means.

13. A device according to any one of claims 10 to 12, wherein the severing means comprises a pivotal member pivotally mounted on the chassis and carrying cutting means for at least partly severing the raised lid portions from the remainder of the article.

14. A device according to claim 13, wherein the pivotal member is pivotal between a first extreme position in which the cutting means do not engage the said raised lid portions, and a second extreme position which is reached at the end of severing, and wherein, following severing, the pivotal member is adapted to adopt an intermediate position in which the said path means defines the said path through the aperture of the compartment at the operating station.
15. A device according to claim 13 or 14, wherein the said path means comprises an outlet member for exit to a patient of air with medicament entrained therein, the outlet member being mounted on the severing means.
16. A device according to claim 15, wherein the said outlet member is connected to the said cutting means and is resiliently connected to the said pivotal member.
17. A device according to any one of claims 10 to 16, wherein the said path means comprises a first duct adapted to bring one side of a compartment at the operating station into communication with atmosphere, and a second duct adapted to communicate with the opposite side of the said compartment.